ISSN 1327-8231

ECONOMICS, ECOLOGY AND THE ENVIRONMENT

Working Paper No. 166

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July 2010

THE UNIVERSITY OF QUEENSLAND

ISSN 1327-8231
WORKING PAPERS ON
ECONOMICS, ECOLOGY AND THE ENVIRONMENT

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Clem Tisdell†

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* Draft contribution for an edited book entitled *Reptiles: Biology, Behaviour and Conservation* to be published by Nova Science, New York.

† School of Economics, The University of Queensland, St. Lucia Campus, Brisbane QLD 4072, Australia
Email: c.tisdell@economics.uq.edu.au

WORKING PAPERS IN THE SERIES, *Economics, Ecology and the Environment* are published by the School of Economics, University of Queensland, 4072, Australia, as follow up to the Australian Centre for International Agricultural Research Project 40 of which Professor Clem Tisdell was the Project Leader. Views expressed in these working papers are those of their authors and not necessarily of any of the organisations associated with the Project. They should not be reproduced in whole or in part without the written permission of the Project Leader. It is planned to publish contributions to this series over the next few years.

Research for ACIAR project 40, *Economic Impact and Rural Adjustments to Nature Conservation (Biodiversity) Programmes: A Case Study of Xishuangbanna Dai Autonomous Prefecture, Yunnan, China* was sponsored by the Australian Centre for International Agricultural Research (ACIAR), GPO Box 1571, Canberra, ACT, 2601, Australia.

The research for ACIAR project 40 has led in part, to the research being carried out in this current series.

For more information write to Emeritus Professor Clem Tisdell, School of Economics, University of Queensland, St. Lucia Campus, Brisbane 4072, Australia.

The Influence of Public Attitudes on Policies for Conserving Reptiles

ABSTRACT

General factors are outlined that may influence the support of members of the public for the conservation of different species of reptiles. Survey results are then summarised of the variations in the likeability of different species of reptiles as well as whether or not their survival is supported by those surveyed. The relationship between these two factors is outlined and its consequences for the survival of reptile species compared to birds and mammals is specified, assuming a decision situation like that depicted by the Noah's Ark problem. Furthermore, the extent to which the results support the similarity principle are considered. A substantial dichotomy in the likeability of different reptile species is observed: turtle species tend to be liked much more than species of crocodiles and snakes. This requires some modification to the similarity principle. This disparity is reflected in a dichotomy in public policies for the conservation of reptiles. Evidence in favour of this hypothesis is outlined and the hypothesis is illustrated by Australian policies for the consideration of reptiles. Some attention is also given to the changes in attitudes towards the conservation of reptiles that can occur as a result of knowledge provision and ecotourism.

Keywords: Attitudes to survival of species, biodiversity conservation, conservation policies, crocodiles, dichotomy in the likeability of reptiles, ecotourism, Phylogenetic similarity principle, reptiles, snakes, turtles.

JEL Classification: Q2, Q57

The Influence of Public Attitudes on Policies for Conserving Reptiles

1. Introduction

Human attitudes towards reptile species appear to be more varied than those towards other vertebrates. For example, the extent to which different reptile species are liked by humans vary considerably, cultural differences in attitudes also occur and attitudes have altered with the passage of time. The purpose of this article is to summarise research results indicating the extent to which members of the public like different species of reptiles, the extent to which they support their survival and how in turn, these factors influence public policies for the conservation of reptile species.

The findings are mainly based on the results obtained from questionnaire-based surveys conducted in Australia and are related to Australia's policies for conserving reptiles. This Australian focus should be kept in mind when drawing conclusions from the results. Nevertheless, the results are placed in wider context and are probably indicative of attitudes in most Western countries towards reptile species.

The subject is explored in the following manner: first, general factors that may influence attitudes to the conservation of reptiles are discussed. Then survey results indicating the likeability of different reptile species reported along with the support of those sampled for the survival of those focal reptile species. The relationship between these two variables is examined. Those sampled are found to be more likely to support the survival of species which they find to be more likeable. The implications of these results for the choice of reptile species for survival compared to species of birds and mammals are then explored. This is portrayed as a Noah's Ark type of problem. The results provide more support for the similarity principle, that is the principle that humans prefer species that are more like themselves and find species that are dissimilar to them, such as reptiles, not to be very likeable.

However, it is then pointed out that a disparity or dichotomy is observed in the likeability of reptile species. Research results indicate that turtle species are liked to a much greater extent than crocodiles and snakes. The implications of this disparity for

public policies for conserving different species of reptiles (such as their farming, ranching and consumptive use) are then considered. This disparity results in a dichotomy in public policies for the conservation of reptiles and this is illustrated by Australia's policies for conserving reptile species. The discussion also includes a consideration of the impact on attitudes to conserving reptiles of knowledge about species and some consequences of ecotourism for conservation.

2. Influences on Attitudes towards the Survival of Reptiles

As is the case of most wildlife species, there are many factors capable of influencing the attitudes of individuals towards the conservation of species of reptiles. These include the following:

(1) Social or communal influences on values and perceptions of reptile species.
(2) The likeability of the species.
(3) The degree to which their survival is endangered.
(4) The extent of the threat or danger they pose to humans. For example, the likelihood that they will cause injury, death or disease to humans.
(5) The extent to which they have economic use value either of a consumptive or of a non-consumptive kind.
(6) Whether they are regarded as a pest by humans. For example, whether they sometimes kill or injure livestock (as saltwater crocodiles do) or destroy crops, as elephants sometimes to.
(7) The extent to which the species competes with humans for the use of natural resources. The greater this competition, the higher is the economic opportunity costs of conserving the species.

Note that the above influences may not be independent and to some extent, they overlap. Furthermore, it should be observed that the extent of support of the public for the survival of a species can differ from the willingness of individuals to support the funding of its conservation. This is because, apart from the likeability of a species, the extent to which the continuing existence of a species is endangered is a major influence on the public's support for allocating funding for its conservation (Tisdell *et al.,* 2007a).

Available evidence (Tisdell *et al.,* 2007a) indicates that the public is reluctant to support the allocation of funds to conserving a species that is not at all endangered even if the species is highly liked and is strongly favoured for survival. The red kangaroo in Australia is an example of this; it is highly liked and strongly supported for survival but individuals do not regard the allocation of funds for its conservation to be a priority (Tisdell, Wilson and Swarna Nantha, 2005; Tisdell *et al*., 2007a). In the case of reptile species in Australia, it is expected that, other things held constant, this factor would increase the public's support for public funding of conservation of sea turtles that are classified as endangered, such as the hawksbill turtle (Tisdell *et al*., 2007b) but reduce support for the funding of the conservation of the saltwater crocodile which is not now endangered (Tisdell and Swarna Nantha, 2007).

The attitudes of individuals towards different species of wildlife (such as their likeability and support for their survival) appear to mould social attitudes and to be moulded by these. For example, some reptiles that are dangerous to humans (such as venomous snakes ad large-sized crocodiles) are (or have been) widely subject to social detestation whereas most species of turtles have a benign relationship with humans and consequently, are socially depicted by a positive image.

Nevertheless, as discussed in Tisdell, Swarna Nantha and Wilson (2006), religious and cultural traditions shape attitudes to different species of reptiles and are not uniform. Negative social views of snakes and crocodiles have tended to prevail in Western cultures but not in all other cultures. For example, Judaic-Christian tradition depicts snakes as vile creatures and in the Bible, as agents of the Devil (Douglas *et al*., 1982). Christians also held negative views about crocodiles according to Rubin (undated). By contrast, some groups in India worship snakes.

Despite this, social values and attitudes towards the conservation of nature are not static (Passmore, 1974). There are two ways in which these attitudes can alter:

(1) moral views about humankind's responsibility to conserve nature can change; and

(2) views about the nature of the cosmos or universe can alter.

Alterations have occurred in Western civilization in both these influences on attitudes towards wildlife. Many Judaic-Christian views of the cosmos have been abandoned

by a substantial proportion of the population in view of scientific findings. Scientific evidence for instance, reveals that even 'noxious' species, such as some reptile species, play an important role in the maintenance of ecosystems. Secondly, the view has grown in Western societies that humankind has a duty to conserve biodiversity and take care of nature (Passmore, 1974). Consequently, there is growing public support for conserving even disliked reptile species as evidenced by results form a sample survey of members of the public conducted in Brisbane, Queensland, Australia, the details of which were reported in Tisdell, Swarna Nantha and Wilson (2005). This survey relied on a sample of 204 Brisbane residents who answered a written questionnaire about 24 Australian wildlife species, five of which were reptiles. Respondents were surveyed twice; initially without providing them with any information about the species to be evaluated, and subsequently, after providing them with photographs and a brief description of the species to be evaluated. Consider some salient and relevant features of the results.

3. The Likeability of Reptile Species and Attitudes to their Survival as Revealed by Surveys

In the two surveys mentioned above, respondents were asked to specify how much they liked each of the reptile species listed in of Table 1. They were presented with the following options: strongly like, like, uncertain, dislike or strongly dislike. Assigning weight of 2, 1, 0, -1 and -2 respectively on these responses, the average weights shown in Table 1 emerged. In this table, the reptile species are listed in terms of their declining average level of likeability.

Table 1: The average of the likeability indices for various reptile species (as revealed by two sample surveys) ordered by declining likeability.

	Reptile Species	Average index in Survey I	Average Index in Survey II[a]
1.	Hawksbill turtle *(Eretmochelys imbricata)*	1	1.21
2.	Northern long-necked turtle *(Chelodina rugosa)*	1.07	1.08
3.	Australian freshwater crocodile *(Crocodylus johnstoni)*	0.4	0.32
4.	Saltwater crocodile *(Crocodylus porosus)*	0.3	0.18
5.	Taipan snake *(Oxyuranus scutellatus)*	−0.31	−0.15

(a)*Note:* Extra information was provided about the species being conducted.

It can be seen that both the turtle species considered are, on average, liked; the crocodile species are not really liked and the taipan snake is disliked. The turtle species are harmless to man but the remaining species were most likely regarded by most respondents as being dangerous to human-kind. In reality, however, Johnston's crocodile poses little danger to humans unlike the saltwater crocodile. On the other hand, the taipan snake is highly venomous and many Australian's would be frightened of it. Observe that the average ordering of likeability of the species did not alter between the surveys (that is, as a result of respondents being given extra information) but some change did occur in the average ratings of likeability of the focal species.

As reported in Tisdell, Swarna Nantha and Wilson (2005), a strong and statistically significant and positive relationship was found between the indices of the average likeability of reptile species in the survey and the percentage of respondents supporting their survival. Those surveyed were asked whether they were in favour of the survival of each of the reptile species considered. The distribution of their responses in Survey II is shown in Table 2.

Table 2: Percentage distribution of respondents in Survey II favouring the survival of each of the listed reptile species

Species	Responses %		
	Yes	No	Unsure
Hawksbill turtle	96.1	1.5	0.5
Northern long-necked turtle	94.6	0.5	2.0
Freshwater crocodile	92.2	2.0	4.0
Saltwater crocodile	90.2	2.0	4.9
Taipan snake	86.3	4.4	7.4

Note: Percentages may not add to 100 due to rounding.

It can be observed that strong support exists for the survival of all the reptile species listed. For example, 86.3 per cent of respondents favoured the continuing survival of the least liked species, the taipan snake. Therefore, although support for the survival of reptile species did increase with their likeability, the support of the majority of respondents for the survival of reptiles (and other species) was independent of their likeability.

4. The Noah's Ark Problem and Support for Phylogenetic Similarity Principle

It has been hypothesised that humans find other species more likeable the closer is their similarity in appearance and other characteristics to humans (Gunnthorsdottir, 2001; Plous, 1993). It is believed that this phenomenon results, on the whole, in mammals being preferred by humans to birds and birds being preferred to reptiles. In turn, it is concluded that humans will be more inclined to save mammals from extinction than birds and less inclined to save reptiles from extinction than birds. This means that in a situation (such as that on Noah's Ark) in which there is limited capacity to save species, the proportions of mammal species (relative to all species of mammals) selected for survival would exceed that for birds which, in turn, would be greater than that for reptiles.

Tisdell, Swarna Nantha and Wilson (2006a; 2006b) have found some empirical support for this principle and for the above mentioned hypothesis derived form it.

This is so if the percentage of individuals favouring the survival of different species is used to select species to be saved. This choice mechanism is equivalent to a system of social decision-making by majority voting.

However, it cannot be concluded that the similarity principle would result in no reptile species being selected for the Ark (survival). From a set of 24 wildlife species (mammals, birds and reptiles) present in tropical Australia, Tisdell, Swarna Nantha and Wilson (2006a; 2006b) found that if only a quarter of the focal set of species consisting of mammals, birds and reptiles could be saved from extinction that one species of reptile would be chosen for survival. In Survey I, it was a northern long-necked turtle and in Survey II (when respondents had greater knowledge of the species to be chosen) it was the hawksbill turtle. The result was, therefore, sensitive to the amount of information that respondents had about the focal wildlife species. Whereas, chelonians had a high probability of being selected for survival, the likelihood of the crocodile and snake species being selected for survival was very low. Indications from the results of Tisdell, Swarna Nantha and Wilson (2006a; 2006b) were that if three-quarters of the focal species were selected for survival, these reptile species should be amongst the rejected species.

5. Dichotomy in the Distribution of the Likeability of Reptile Species

It has been claimed that the extent to which the public likes or dislikes different species of reptiles tends to form a dichotomous or bipolar distribution (Czech *et al.*, 1998). Czech *et al.* (1998) contend that the public divides reptile species into two groups: turtle and tortoise species and the remainder (lizards, snakes and alligators/crocodiles). The former group is greatly liked by the public whereas the latter is not. According to Babbit (1995), the favouritism is reflected in the allocation of the US Government's funding for the conservation of wildlife species. Babbit (1995) found that 98% of this funding for threatened and endangered reptile species was allocated to the conservation of tortoise and turtles.

The above-mentioned relationships are, on the whole, consistent with the findings of Tisdell *et al.* (2006a; 2006b) and that of Tisdell, Wilson and Swarna Nantha (2005) However, in their studies Tisdell and co-researchers did not include any species of

lizards in their surveys. It is probable that some species of lizards would have an intermediate degree of likeability in comparison to chelonians and other reptiles. This is a matter that requires more research. In this regard, it might be noted that Stephan Swanson (2005, p.4) comments that "Australians are generally tolerant of lizards. We don't feel threatened by them in the same way that some people feel threatened by snakes".

Nevertheless, it seems clear that the dispersion of the public's likeability of different species of reptiles is much greater than that for either species of mammals or birds. For example, Tisdell, Swarna Nantha and Wilson (2005) found that the co-efficient of variation for the mean likeability indices of their sampled respondents for reptile species was 112% but for species of birds it was only 13% and for mammal species, 14%. This principle of disparity in likeability of reptiles is unlikely to be overturned by further research.

6. Knowledge, Ecotourism and Changes in Conservation Behaviours and in Attitudes of Humans to Reptiles Species.

The provision of information to individuals about the characteristics of species tends to alter their evaluation of these (Tisdell and Wilson, 2005; Tisdell, Wilson and Swarna Nantha, 2005; 2006a; 2006b; Tisdell, Swarna Nantha and Wilson, 2007a; 2007b) For example, the stated likeability by individuals of focal species usually becomes more dispersed as individuals become more informed and then willingness to donate funds to conserve different species also becomes more uneven. This is true for reptiles as well as for species of mammals and birds. Furthermore, average willingness to pay for the conservation of less well known species increases as individuals become better informed about these (Tisdell *et al.,* 2007a; 2007b) For example, Tisdell Swarna Nantha and Wilson (2005, p.169) found that when individuals were better informed about the set of reptile species listed in Table 1, the mean likeability of the group increased and that the individuals surveyed were willing to donate an increased amount to their conservation compared to their willingness to donate funds to charities in order to assist humans.

Information provision about the status of species and their conservation needs, such as that associated with some types of nature-based tourism or ecotourism, often develop positive attitudes in tourists towards the conservation of wildlife species featured in such tourism. For example, Tisdell and Wilson (2005) found from a sample survey of visitors to Mon Repos Conservation Park in Queensland that they developed positive attitudes and behaviours to the conservation of marine turtles. This park contains an important turtle rookery, and caters for visitors who come to watch marine turtles on shore as they arrive for nesting. Visitors may also observe turtle hatchlings as they emerge and make their way to the sea. Visitors to this rookery are informed by several means about the status of marine turtles and measures needed to help conserve them (Tisdell and Wilson, 2005).. Nearly all respondents stated that their desire to conserve marine turtles was increased by their visit to the rookery and most stated that they had become more willing to take direct actions to protect sea turtles.

A significant positive statistical association was found between those saying that their visit to the Mon Repos rookery was educational and the frequency with which they also stated that their desire to protect sea turtles had increased following their visit to Mon Repos (Tisdell and Wilson, 2005, p.290). However, a somewhat larger marginal effect on increased desire to protect marine turtles was observed in cases where visitors saw adult turtles or hatchlings during their visit. This relationship was also statistically significant. Those coming to watch turtles at Mon Repos during the 'turtle season' are not assured of sightings of turtles. Hence, sometimes visitors obtain information (educational material) about marine turtles but do not see them.

The above result suggests that knowledge provision is only one factor that may help to develop positive attitudes towards the conservation of reptiles and other wildlife. Encounters with wildlife that positively appeal to the senses of human beings also play a major role. In the above case, vision was important, and in some circumstances, auditory, tactile and olfactory factors are capable of influencing the attitudes of individuals to the conservation of individual species.

While the above-mentioned results paint a positive picture of the influence of ecotourism on attitudes and behaviours of individuals towards focal wildlife species, some qualifications need to be considered. First, the positive effects on these attitudes

and behaviours are likely to decay with the passage of time as the original stimuli weaken and forgetting and crowding out occur (Tisdell *et al.*, 2008). Secondly, not all nature-based tourism presents a positive picture of wildlife species that are the basis of such tourism. For example, some tours for watching crocodiles emphasise only the dangerous and ferocious nature of these species and do not explain their functions within the ecosystems. Consequently, such tours probably reinforce negative attitudes towards the conservation of crocodiles.

7. Dichotomy in Policies for Conserving Reptile Species with Particular Reference to Australia's Policies

Some background

Reptile species have many economic values which vary with the species being considered. Some, such as crocodiles, have consumptive use value. Their hides and meat can be utilized by humans. Depending on the species of marine turtle, their meat, eggs and shell can be used by humans. Crocodiles may also be subject to recreational or trophy hunting. The non-consumptive use value of several reptile species derives mainly from their value for non-consumptive and non-destructive forms of nature-based tourism. Marine turtles and crocodiles, in particular, are frequently used as non-consumptive tourist attractions. In addition, several species of reptiles possess non-use or passive economic values. This component of total economic value is very high for some species of marine turtles such as the hawksbill turtle (Tisdell *et al*., 2007b, pp.40-41).

Several species of reptiles (for example, crocodile and turtle species) become available for consumptive use by humans as a result of hunting, ranching and farming. Sometimes farming of reptiles is completely dependent on ranching (that is the collection of reptile eggs and juveniles from the wild which are then cultured) but closed cycle farming has also been developed for some reptiles, such as saltwater crocodiles and green turtles. In Queensland (Australia), virtually only closed cycle farming of saltwater crocodiles is allows but in the Northern Territory and Western Australia, a combination of ranching and closed cycle farming of crocodiles occurs.

Dichotomy in policies of utilizing reptile species

While consumptive use of crocodiles is permitted in Australia, consumptive use of marine turtles is not allowed except by indigenous Australians for their own consumption. There has been considerable debate about whether Australian Aborigines and Torres Strait Islanders should be allowed greater latitude than other Australians in using protected species for their own consumption and whether they should be given increased scope for commercial use of wildlife species (Tisdell and Swarna Nantha, 2008).

In general, in Australia, policies for the commercial use of crocodile species are much more liberal than those for the commercial use of marine turtles. While utilization of wild stocks of crocodiles is controlled in Australia, managed ranching is allowed in the Northern Territory and Western Australia (where it is also combined with closed cycle farming of crocodiles) and in Queensland, farming but not ranching is allowed (Tisdell and Swarna Nantha, 2007). Consumptive use of marine turtles is illegal in Australia, except for their use by indigenous people. There appears to be no intention by the Australian Government to foster the ranching and farming of marine turtles in order to develop a commercial industry of the type that has been established for crocodile production. Partly, this is because of bans imposed on international trade in marine turtles and products derived from them under the Convention on International Trade in Endangered Species (CITES). These restrictions have hampered the development of farming of marine turtles (Tisdell *et al*., 2007b). This has happened despite the fact that many of the conservation and ecological arguments in favour of the farming of marine turtles are similar to those applying to the farming of crocodiles.

A major reason for this dichotomous conservation policy seems to be the dichotomy of the attitudes of the general public to turtles compared to crocodiles. For example, when a sample of the Australian population was asked whether or not they favoured the sustainable commercial harvesting of selected reptile species, a majority supported this commercial use for saltwater crocodiles, freshwater crocodiles and taipan snakes but opposed it for the northern long-necked turtle and the hawksbill turtle (Tisdell *et al*., 2007c, p.139). It was found that the greater the stated likeability of a species and the higher the perceived extent of is endangerment, the stronger was the opposition of the sampled members of the public to its sustainable commercial harvesting (Tisdell

et al., 2007c). The faith of those surveyed is the ability of sustainable commercial use of endangered species to ensure their conservation was limited. In fact, some respondents appeared to give no credence to the proposition that sustainable use would be an effective mechanism for conserving species.

Commercial ranching and farming and provision of economic incentives for the conservation of reptiles

Ranching of reptiles involves the taking of their eggs or of juveniles from the wild and cultivating them in captivity. Alternatively, or as well, breeding stock may be taken from the wild in order to rear their offspring in captivity. Closed-cycle farming of reptiles relies solely on reproduction using farmed reptile stocks, once these stocks are established. Therefore, various types of ranching are possible and mixed systems of farming reptiles occur. Closed cycles are possible for the culture of crocodiles and green turtles, for example, but their farming often depends on some supplementation by drawing on wild stocks. Significant supplementation of farm-produced crocodile stocks by wild stocks occurs, for instance, in the Northern Territory of Australia and Western Australia but not in Queensland.

Once established, closed-cycle farming of reptiles ought to be independent of wild stocks. However, even closed-cycle farming of reptiles has in some instances, been opposed by some conservationists. They have argued, for example, in relation to the meat of the green turtle that its increased availability from farms could increase the demand for it, and that in turn, this could spill over to increased demand for green turtle meat sourced from the wild. Therefore, this could endanger wild stocks (Tisdell, 2005, Ch.6). Presumably, the same argument might be used in opposing the commercial harvesting of hawksbill turtles for their shell. However, the same argument does not seem to have been pursued in relation to the farming of crocodiles, probably because they are much less liked by the general public than turtles.

Ranching has direct impacts on the population of focal species, and if the farming of ranched animals is very profitable, it can endanger the wild population if open-access or relatively open-access to wild stocks occurs. In such circumstances, some regulation of harvesting (by the state or communities) is often required to sustain wild populations of the ranched species. In the Northern Territory, for instance, state

regulations limit the amount of the annual harvest of crocodile eggs and juveniles from the wild and therefore, their supply to crocodile farmers.

The overall quota for the taking of crocodile eggs and juveniles is allocated to individual landholders by the Government of the Northern Territory. Landholders can then sell their rights to collectors who supply their eggs and juveniles to crocodile farmers. The Northern Territory Government favours a policy of conserving wildlife species by their sustainable use when this is practical. Policy-makers in the Northern Territory seem to believe that payments to landholders by collectors of crocodile eggs and juveniles would provide an economic incentive to landholders to adopt means to conserve crocodiles, such as sparing habitat favourable to crocodiles. However, a survey of managers of cattle properties in the Northern Territory indicates that these payments are insufficient to entice landholders to alter their land-use practices so that their land use is more favourable to the survival of crocodiles (Tisdell and Swarna Nantha, 2007).

In addition, virtually all the landholders surveyed said that the amount of income they received from collectors of crocodile eggs and juvenile crocodiles was insufficient to compensate them for the cost of their loss of livestock due to crocodile attacks. The fact, however, that landholders receive some income from ranching activities on their properties probably made them less intolerant of government policies to protect crocodiles.

The policies of the Northern Territory Government for conserving crocodiles have proven to be very effective and crocodile populations have increased considerably (Webb *et al.*, 2000; also see Webb and Manolis, 1989). However, this effect has not been due to changes in land-use policies by landholders. It seems rather to be the result of an effective quota system limiting the harvesting crocodiles and their eggs, and the fact that crocodiles older than juveniles are infrequently taken from the wild.

8. Conclusion

The reported research results provide qualified support for the phylogenetic similarity principle, namely that there is a tendency for reptiles, as a whole, to be less liked than

birds and in turn, for birds to be less liked than mammals. Decreased likeability of these species is associated with a reduction in the proportion of individuals supporting their survival. This means that in a situation where some species are bound to perish because of resource constraints, reptile species are likely to be over represented amongst those species extinguished and under represented among those saved, as was illustrated by the Noah's Ark problem. Nevertheless, in the survey results reported, there was strong support for the survival of all wildlife species, including the least liked reptile species.

One reason why the phylogenetic similarity principle is not fully satisfied is that the level of likeability of different reptile species displays a wide dispersion: most turtle species are liked very much whereas, on the whole, crocodiles (and their relatives) and snakes tend to be disliked. Thus, to some extent, there is a dichotomy in the likeability of reptile species which is replicated in policies for their conservation. For example, funding for the conservation of turtles accounts for the lion's share of funding for the conservation of reptiles in most countries. Furthermore, there is widespread opposition to the farming and ranching of marine turtles in Western countries but not to the farming and ranching of crocodiles (and alligators). Australia's policies for conserving reptiles reflects this division: farming (and is some Australian states, ranching) of crocodiles is allowed and practised but this is not permitted in the case of marine turtles.

It was also pointed out that the provision of knowledge about reptile species and sensory experiences with them, such as may be obtained from some forms of nature-based tourism (for instance, ecotourism) can stimulate the development of positive attitudes towards their conservation. This was illustrated by changes in the conservation attitudes and the intended behaviours of visitors who came to Mon Repos turtle rookery to see marine turtles. However, it was also suggested that the intensity of these effects is likely to diminish with the passage of time, if there is little or no reinforcement of the initial stimuli.

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